

translation

PATENT COOPERATION TREATY

PCT/EP2003/010411



PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

23 MAR 2005

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| Applicant's or agent's file reference T50323PCT | FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) | |
| International application No. PCT/EP2003/010411 | International filing date (day/month/year) 18 September 2003 (18.09.2003) | Priority date (day/month/year) 23 September 2002 (23.09.2002) |
| International Patent Classification (IPC) or national classification and IPC G06K 9/20 | | |
| Applicant TROPF, Hermann | | |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

| | |
|--|--|
| Date of submission of the demand 08 April 2004 (08.04.2004) | Date of completion of this report 14 December 2004 (14.12.2004) |
| Name and mailing address of the IPEA/EP | Authorized officer |
| Facsimile No. | Telephone No. |

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International Application No.

PCT/EP2003/010411

I. Basis of the report

1. With regard to the elements of the international application:*

- ☐ the international application as originally filed
- ☒ the description:
 pages 1-15, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☒ the claims:
 pages 2-11, 13-17, 19-21, as originally filed
 pages _____, as amended (together with any statement under Article 19
 pages _____, filed with the demand
 pages 1, 12, 18, filed with the letter of 15 September 2004 (15.09.2004)
- ☒ the drawings:
 pages 1/4-4/4, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
 pages _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item. These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International Application No.
PCT/EP 88/10411

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | | |
|-------------------------------|--------|------------|-----|
| Novelty (N) | Claims | 1-9, 12-21 | YES |
| | Claims | 10, 11 | NO |
| Inventive step (IS) | Claims | 1-9, 12-21 | YES |
| | Claims | 10, 11 | NO |
| Industrial applicability (IA) | Claims | 1-21 | YES |
| | Claims | | NO |

2. Citations and explanations

1. Reference is made to the following documents:

D1: EP-A-0 226 938 (MESSERSCHMITT BOELKOW BLOHM)

1 July 1987

D2: DE-A-4 142 614 (Tropf) 15 April 1993

D3: US-A-4 873 651 (Raviv) 10 October 1989

1.1. Documents D2 and D3 were not cited in the international search report.

2. The problem solved by the invention is that of detecting, gripping and handling unsorted objects by means of image processing.

2.1. Documents D1 and D3 do not disclose that an object is photographed from a plurality of camera directions. Only one single stationary camera is used in the method described in these documents. Expanding the method to include a plurality of camera directions cannot be considered obvious. Document D2 is therefore considered the prior art closest to the subject matter of claim 1, although D1 and D3 are apparently more similar to the invention (see D3, column 5, lines 23-48).

2.1.1. Document D2 discloses (the references in parentheses are to D2):

a method (see abstract) for establishing a data pool with the assistance of two imaging devices and two illumination devices,
an object being photographed from two camera directions and being illuminated from two different illumination directions, each in incident light, each camera direction approximately opposing one illumination direction (figure 2, compare with e.g. figure 3 of the application), so that at least one contour of the object appears from each of the two camera directions, said object having a bright side and a dark side,
and the entire object essentially being photographed from two different camera directions by the two imaging devices (figure 3),
and the recorded images and data derived therefrom being saved in the data pool (column 4, lines 25-43).

2.2. The subject matter of claim 1 thus differs from the known method in that:

- a) the camera directions and the illumination directions on the one hand and the object on the other hand can be moved relative to each other with a plurality of degrees of freedom;
- b) the object is photographed from at least three different camera directions;
- c) the recorded images and/or the data derived therefrom are saved in a data pool for use as reference images in a method for gripping objects.

2.3. Difference a): This feature is an obvious measure for solving problems involving unknown or imprecise

positioning of the workpieces (see the description, page 13, lines 18-23).

2.4. Difference b): At least two cameras are mentioned in document D2. Expanding to more than two cameras, for example, in order to detect a more complex set of hard shadows, is therefore considered obvious.

2.5. Difference c): It is doubtful whether a person skilled in the art would acknowledge that the arrangement described in D2 could be used for a backup.
For such an arrangement, the position of the object must be estimated or detected, in which case the correspondences between (three-dimensional) model information and image data must normally be determined. However, reference images are used in claim 1.

2.6. Although differences a) and b) do not themselves involve an inventive step, the different measures in combination could possibly permit a quicker and/or more reliable detection of the positions of objects to be gripped (see page 10, line 23 to page 11, line 11). Therefore, the subject matter of claim 1 is not considered obvious.

3. The same argumentation applies accordingly to independent claims 12, 17 and 18.

4. The subject matter of claims 10 and 11 relates to products of the method according to claim 1. Images recorded by the method according to claim 1 cannot be differentiated from images generated by other methods, e.g. by the method according to D2 and

human manipulation (displacement, rotation) of the object.

Therefore, the subject matter of claims 10 and 11 is not novel. See PCT Guidelines (edition: 11 March 2004), paragraph 5.26.

5. Dependent claims 2-9, 13-16 and 19-21 include the subject matter of claims 1, 12 or 18 and therefore also involve an inventive step.